

PREHealth

Designing health into urban green and blue infrastructures – The need for action in planning, policies, and research

National Report the Netherlands



Erasmus+



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Terms of References

This report is part of the project *"PREHealth: Promoting education and jobs to enhance the use of urban blue and green infrastructure for health and fitness"*.

The objectives of the current report are to give an overview of:

- the Dutch national literature, examining health behaviors and public space use
- the policy and best practices of the city of Eindhoven regarding the use of open space for promoting health and wellbeing.

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EINDHOVEN





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Abstract

This report gives an overview on the health profile of the Dutch population and of the city Eindhoven in particular. The objective of this program is to keep the growing cities in the Netherlands healthy so people can live, work and relax in a healthy environment. This includes better air quality, less noise pollution and smart and healthy urban planning for a city that encourages healthy behavior. This report addresses how urban public spaces (blue and green infrastructure) could stimulate healthy behavior. Healthy behavior not only includes physical activity (PA) and sports, but also activities to unwind from stressful situations, mental wellbeing and keeping up with social contacts. The first part of the report describes the health status of the Dutch population, showing that a considerable amount of people is not meeting the physical activity guidelines, describes the groups at risk, the constraints for engaging in physical activity, and the role of the geographical environment. The second part zooms in on the city of Eindhoven and presents the policy and best practices of Eindhoven regarding the use of public open spaces for health promotion. The city of Eindhoven is a pilot city of the national 'Smart and Healthy City' program, involving a variety of initiatives and projects concerning public health and smart government. Next, the Brabant Health Deal is being described, focusing on themes such as social capital, quality of life and creating a facilitative and adaptive environment for healthy behavior, welfare and care. Lastly, an overview of best practices is provided, ranging from a lifted bicycle lane (The Hovenring) to a smart walking route with interactive poles.

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1. Introduction and challenges

The Netherlands, is a highly-urbanized country, in which mechanical ways of transport, air pollution, noise, supply of unhealthy foods, alienation and violence are factors, which can cause serious physical and mental diseases. It has been estimated that 50% of the current total disease burden in the Netherlands is due to modifiable risk factors, i.e. health-behaviors (e.g. diet, physical activity, tobacco use and alcohol consumption) and their underlying environmental determinants. These determinants refer to physical environmental factors (like the accessibility of facilities, available infrastructure, air and water quality, green spaces, and physical disorder) and social environmental factors (like social capital, social support, bustle of people on the streets, and norms and values regarding health-related behaviors). Large inequalities between the sexes, age groups, income categories and ethnicities in these personal exposures occur.

In the Netherlands, perspectives on health are in transition. First, the interpretation of health is moving away from a one-sided focus on disease itself to the ability of people to adopt and to self-manage all their life domains. In the year 1948, the World Health Organization (WHO) came with a definition for health: "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2014). Machteld Huber and her colleagues show that this definition no longer fulfills the concept of health (Huber et al., 2011). According to them, the definition from the WHO is focusing on disease and how to medicate this disease (Louis Bolk Institute, 2017). Therefore, a new interpretation of health was launched in 2012 expressed in the concept of Positive Health. This concept consists of six dimensions of health. Normally, someone is called healthy when there is an absence of sickness or disease. As the name suggest the concept has a positive view on health. Instead of focusing on diseases, Positive Health is about what people can do and not about what people can't do. So, if someone is partly paralyzed and in a wheelchair for example, Positive Health looks at how these people can exercise with the muscles they still can use. This means that people are important in this approach instead of the disease. There are six dimensions within the Positive Health approach (Institute for Positive Health, 2017):

- Body functions (medical facts, pain, physical problems, etc.)
- Mental functions (emotional situation, resilience, cognitive functioning)
- Meaningfulness (perspective, acceptance, goals)
- Quality of life (enjoying life, feeling well)
- Participating (social skills, relationships, social contacts, involvement)
- Daily functioning (ability to work, daily chores)

These six dimensions are the key factors to indicate someone's health, see Figure 1. They all are approached from a positive view. For example: What are someone's body functions? Instead of the question whether someone has physical limitations or not. Someone can be healthy because there are no symptoms of any disease or disability, but still experience the negative effect of not participating in society. This shown in interdisciplinary research programs such as Healthy Urban Living of Utrecht University (<https://www.uu.nl/en/research/sustainability-healthy-urban-living>) or policy oriented programs such as Health Deal Brabant (<https://www.brabant.nl/actueel/nieuws/2016/juli/brabantse-health-deal-impuls-voor-gezondheid-en-welzijn.aspx>; <https://www.linkedin.com/pulse/brabant-health-deal-multi-disciplinary-sustainocratic-jean-paul-close>).

The second transition refers to the increasingly prominent role given to exposures to physical, social and economic environments over time in understanding morbidity and mortality of people (Forouzanfar et al., 2015; Wild, 2005). Especially, the fast-growing urban environments giving way to sedentary and unhealthy lifestyles received urgent priority (The Lancet, 2011; WHO, 2016). Increasingly, in research

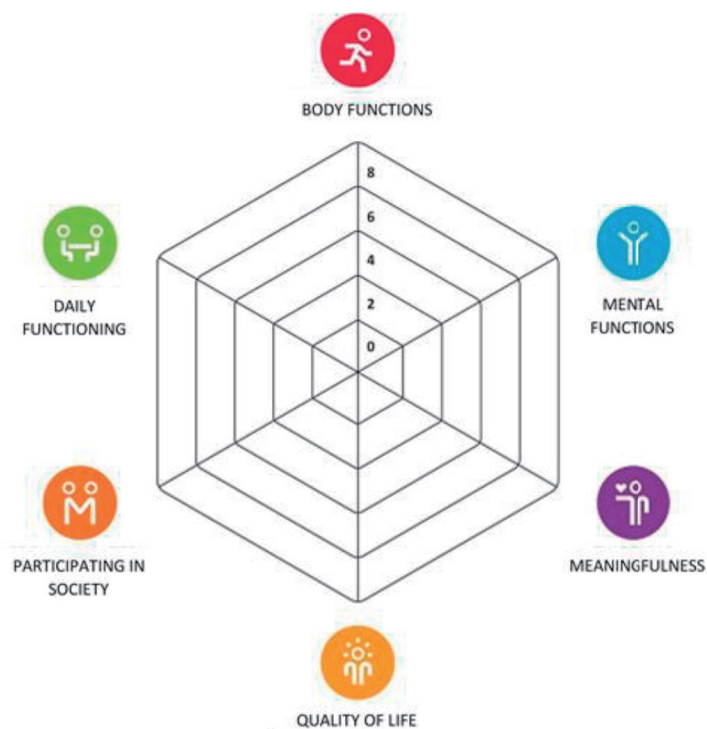


Figure 1: The six dimensions of Positive Health.
Source: Institute for Positive Health(2017).

and policies the focus is on (interventions in) the attributes of the urban environments which contribute to health and health behaviors.

2. Approach

The present report is based on national literature review and local policy documents regarding health-related behavior in urban public open spaces. The national literature review is based on scientific articles and national reports by various health organizations (GGD, Volksgezondheidzorg. info) and institutions (Mulier Institute, Institute for Positive Health, TNO, CBS). These publications give a clear view of the Dutch policy on improving health in public spaces and health statistics of the Dutch population.

Policy documents on the website of the city of Eindhoven (<https://www.eindhoven.nl/>) gave insights on the health-related behavior in the urban public open spaces of Eindhoven. Several documents were used for this part (Brabant Health Deal, Bewegen door verbinden, Handboek Openbare Ruimte). An interview with Koen Kerklaan (policymaker at the municipality of Eindhoven) also provided insights on policy and best practices of health improving initiatives in the public space of Eindhoven. The websites of the different best practice initiatives provided information and pictures about the best practices, in some cases Facebook pages of local initiatives were valuable for additional information.

3. Main findings

3.1 Health profile of the Netherlands

In this section, we present the health profile in the Netherlands based on a comparison between some European countries.

The Netherlands has an exercise norm which gives advice on the amount of physical activity people should get to stay healthy. This norm is called the NNGB (Nederlandse Norm Gezond Bewegen) and is based on three age groups (Youth Monitor, 2017):

- Children (under 18): To stay healthy, children should have at least one hour of moderately intensive physical activity every day, where at least twice a week the activity is aimed at improving or maintaining physical fitness.
- Adults (18-55 years): For adults, the daily physical activity norm is lower. They should have at least 30 minutes of moderately intensive physical activity (by walking or cycling) on at least five days a week.
- 55 years and above: The norm for this age group is the same as for the 'adult' age group: 30 minutes of moderately intensive physical activity (by walking or cycling) on at least five days a week, but preferably more often. For people that are less active, with or without physical limitations, all the extra physical activity is significant, no matter what the intensity, duration, frequency or type of activity.

The MET (metabolic equivalent) value expresses the intensity of a physical activity. There are light, moderate and heavy MET value's. Each age group has its own MET value that is required to stay healthy. Children should have one hour of 5 to 8 MET activity, while adults should have a half an hour of 4 to 6,5 MET activity and people over 55 years should have 3 to 5 MET activity for half an hour (Youth Monitor, 2017).

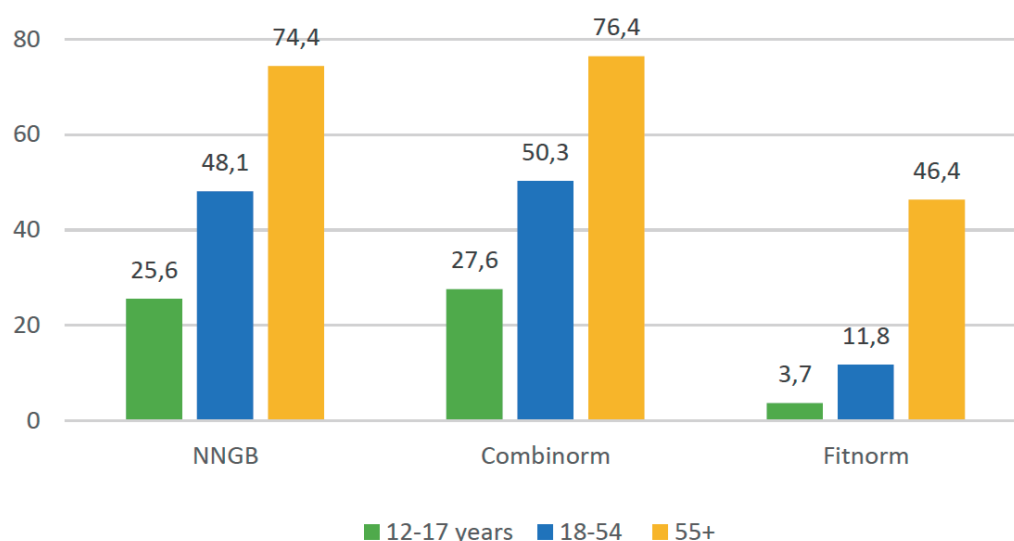


Figure 2: Percentage of people that meet the NNGB, Fitnorm and Combinorm (in 2016).
Source Volksgezondheid.info (2017).

Figure 2 shows the percentage of Dutch people that meet the NNGB, the 'Fitnorm' and the 'Combinorm'. The Fitnorm is about whether people meet the advised MET value to stay healthy. This norm describes that people of all ages should meet 20 minutes or more intensive physical activity for at least three times a week. The MET-value for this 20 minutes intensive physical activity differs from 8 MET for children, 6,5 MET for adults and 5 MET for people from 55 years and above (Volksgezondheidszorg.info, 2017). The Combinorm is a combination of the NNGB and the Fitnorm. People meet the 'Combinorm' when they meet the NNGB or the Fitnorm (Volksgezondheidszorg.info, 2017). As Figure 2 shows, the percentage of people that meet the NNGB norm is much higher than the percentage of people that meet the Fitnorm. People are physically active enough to meet the advised moderate physical activity standard of the NNGB, but they don't show enough intensive physical activity to meet the Fitnorm. Figure 2 also makes clear that the older people are, the more they meet the various physical activities norms. The large differences between the age groups are (mainly) caused by the strict physical activity norm for children and the less strict norm for adults and people above 55 years old (Volksgezondheidszorg.info, 2017).

3.2 Physical activities in the Netherlands: an international comparison

Sports and exercise

According to the 'sport and physical activity' Eurobarometer, Dutch people regularly participate in sports (Directorate-General for Education and Culture, 2014). About 58% of the Dutch population participates in sports on a weekly basis (see Figure 3). In comparison, the European average is 41% sport participation on a weekly basis. The Nordic countries (Denmark, Sweden and Finland) score higher than the Netherlands on weekly sport and exercise participation. The Netherlands is on a 4th position. The other countries in Western Europe score significantly lower on sports or exercise participation (Directorate-General for Education and Culture, 2014).

However, these results are above average. Dutch people also show much sedentary behavior. A quarter of the Dutch population is not (or barely) participating in sport activities. Another 19% is participating in sports, but not on a weekly basis. The differences in sports participation are mainly depending on sociodemographic characteristics (Rapportage Sport, 2014). Dutch people are seated for 6.8 hours a day, while the European average is about 5.2 hours a day (Bennie et al., 2013). Sedentary behavior like sitting and having not enough physical activity could have serious health effects with an increased chance on disease or eventually death (Rapportage sport, 2014). Despite daily exercise or physical activity, being seated for many hours a day could still bring those health effects (van der Ploeg et al., 2012). Much physical activity doesn't exclude sedentary behavior. Depending factors such as gender, age and socioeconomic status are important when it comes to (the lack of) physical activity (Leech et al., 2014). In the section 'Health behaviors in the Netherlands by socio-demographics' physical activity and sport or exercise participation in the Netherlands will be discussed by age, socioeconomic status and ethnicity.

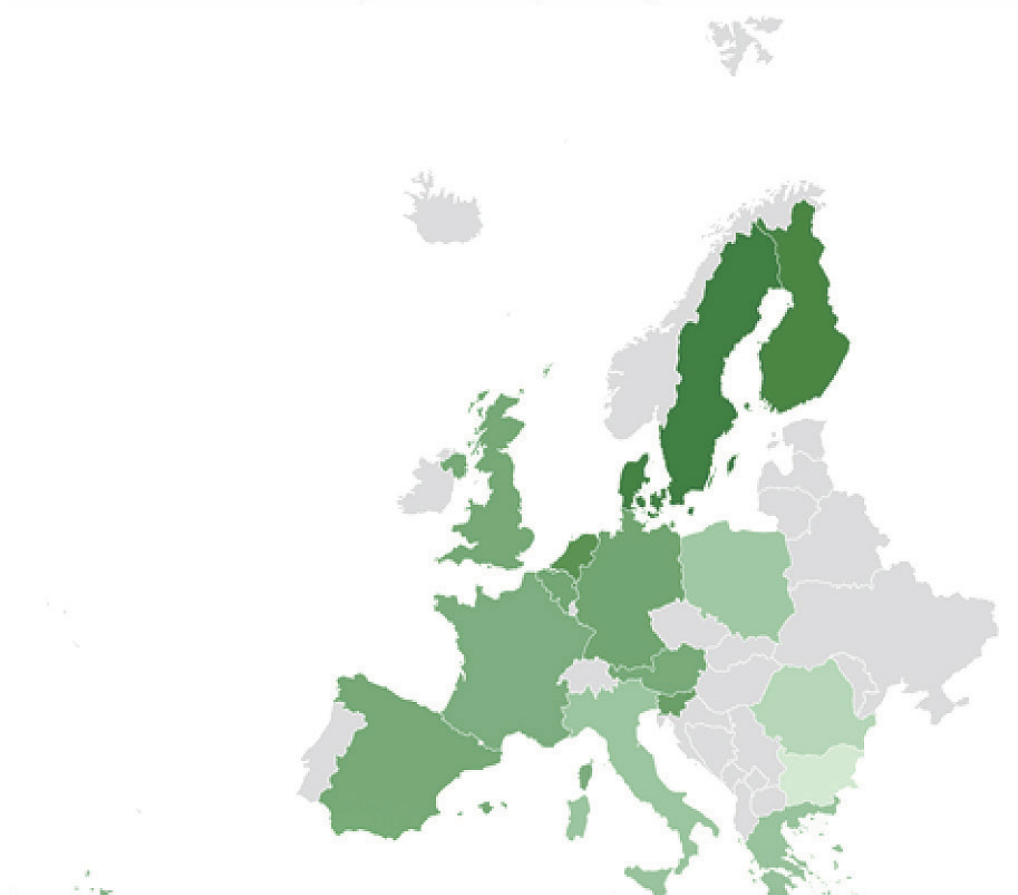


Figure 3: Exercise or sports on a weekly basis in Europe.
Source: Directorate-General for Education and Culture (2014).

Physical activity (other than sports)

The Dutch population scores high when it comes to other physical activities than sports: cycling, walking, dancing or gardening for instance (Figure 4). While 15% of the average European population regularly (five times or more per week) do physical activities, the Dutch population scores significantly higher with 44% of regularly physical activity. The Netherlands has the highest percentage of participation in physical activities with a regularly frequency. There is also a percentage of 39% that participate in physical activities with some regularity (once to four times a week) compared to 33% of the European's average. About 18% of the Dutch population seldom or never take part in physical activities, while the European average of people who seldom or never take part in physical activities is 52% (Directorate-General for Education and Culture, 2014).

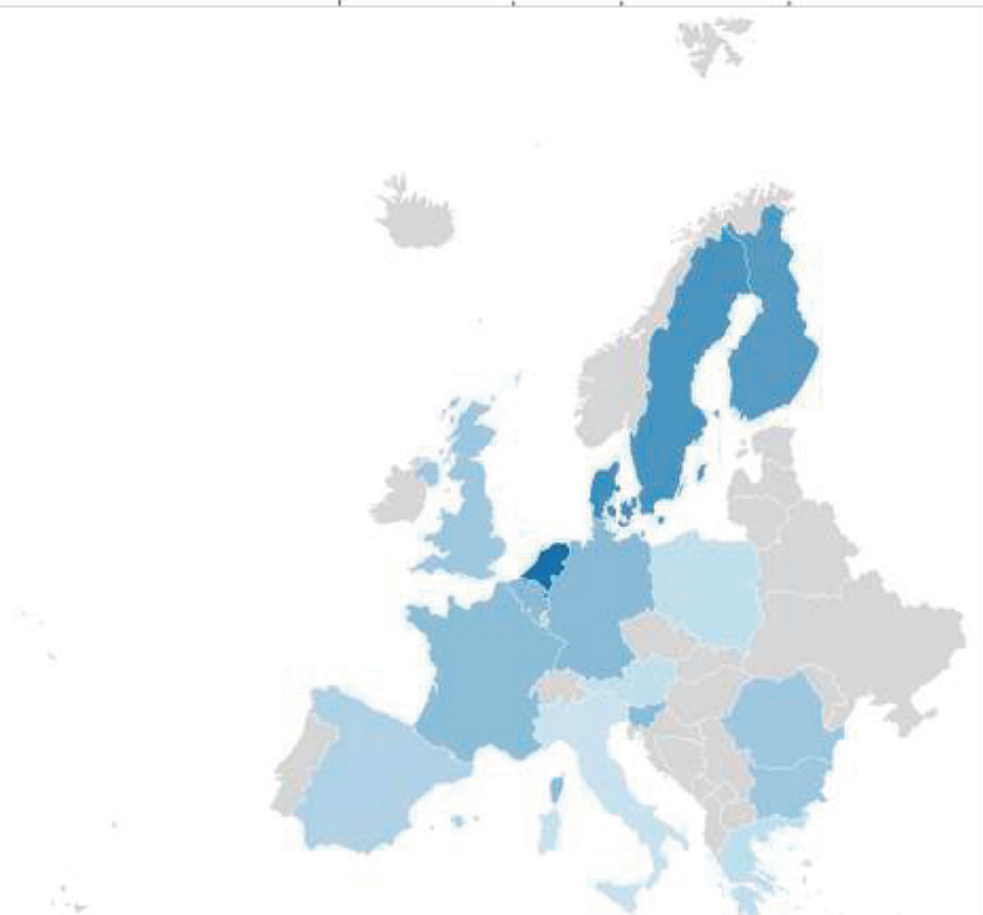
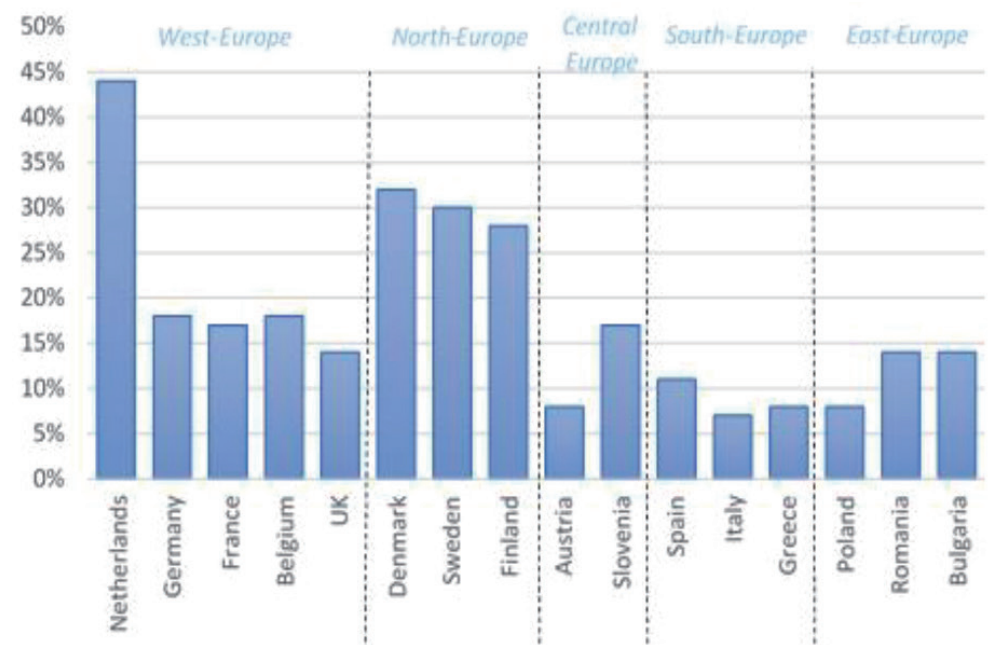


Figure 4: Other physical activities (other than sports) on a weekly basis in Europe.
Source: Directorate-General for Education and Culture (2014).

3.3 Health behavior in the Netherlands: constraints, socio-demographics and urban environments

Constraints

This section will shortly discuss the constraints that Dutch people face and reasons why they don't participate in sports as they would like to. In the report of Van der Dool (2015) the main constraints for sporters and non-sporters to participate more in sports and PA were given. These main constraints are displayed in Table 1. Lack of time is the main constraint that Dutch people face when they want to participate more in sports. Non-sporters also face constraints in their physical health or motivation. Sometimes participating in sports is just too expensive for non-sporting Dutch people.

	Total	Non-sporters	Sporters*
Constraints	23%	15%	40%
1. Lack of time (because of work, study or family)	37%	28%	34%
2. Physical problems/illness	22%	30%	18%
3. No motivation/no pleasure	18%	26%	7%
4. Too expensive	15%	18%	7%
5. Spending time on other activities	14%	12%	14%
6. Weather/night time	13%	9%	13%
7. Lack of endurance	12%	18%	5%
8. No one to sport with	12%	14%	7%
9. Feeling unable to come along	5%	6%	3%
10. Afraid to fall/get injured	4%	6%	3%
11. Sport clubs are too competitive	4%	4%	3%
12. Not (enough) facilitated in the neighborhood	3%	2%	2%
13. Safety (around sports facilities)	1%	0%	1%
14. Other	4%	6%	3%

* Participated at least 120 times in sport over the last 12 months.

Source: Van den Dool, 2015

Table 1: Constraints of Dutch people to participate more in sports and physical activities.

In the publication of Deelen et al. (2016) the theory of hierarchical leisure constraints is used. This theory states that there are three main categories of constraints that keeps people from being physically active (Crawford et al., 1991; Crawford & Godbey, 1987; Godbey et al., 2010):

1. Intrapersonal constraints
2. Interpersonal constraints
3. Structural constraints

Intrapersonal constraints involve individual physical or psychological constraints (Deelen et al., 2016 p. 242). Table 1 shows the main constraints that keep Dutch sporters and non-sporters from being physically active (van den Dool, 2015). Constraints as 'Physical problems/illness', 'No motivation/no pleasure', 'Lack of endurance', 'Feeling unable to come along' and 'Afraid to fall/get injured' are intrapersonal constraints, because they involve individual physical or psychological reasons (Deelen et al., 2016).

The interpersonal constraints refer to the constraints caused by the dependency on other people, such as the inability to find a partner to take part in a sport's activity (Deelen et al., 2016 p.242).

The constraint 'No one to sport with' from table 1 is an example of this interpersonal constraint. Lack of time and of financial resources could be important reasons why people aren't physically active or participating in sport. These reasons can be categorized as structural constraints (Deelen et al., 2016). Structural constraints are limitations that derive from spatial determinants and include problems related to the accessibility of sports, facilities, transport, financial resources and the quality of sport facilities, but also time constraints (Deelen et al. 2016 p. 242).

Figure 5, shows the division between the three constraint categories of the total group of Dutch sporters and non-sporters. The percentages are established from the constraints in table 1. The structural constraints form the largest constraint category in this national sport research (van der Dool, 2015). The physical environment could influence these structural constraints if the environment stimulates and facilitates physical activity. That's why the policy of public space will be discussed later in this chapter.

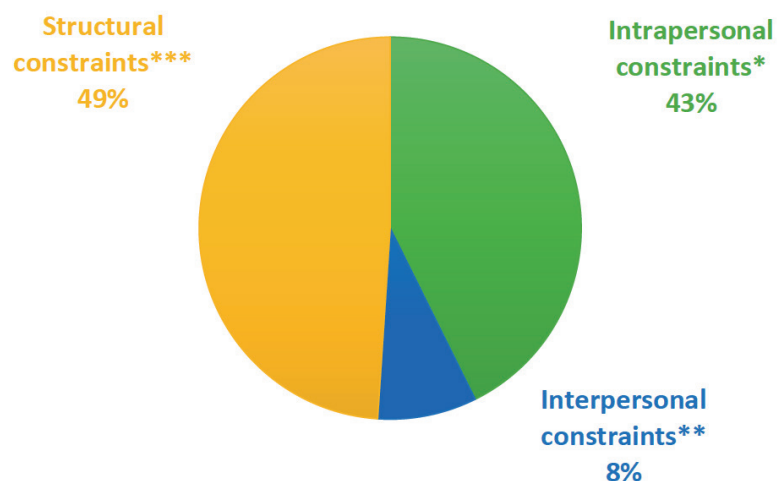


Figure 5: Shares of different types of constraints.

Age

Recently there has been issued a national report on sport and physical exercise by the Mulier Institute. The Mulier Institute is the only independent, non-profit scientific sport-research institute in the Netherlands. In March 2016, they conducted a national research including a survey among 4,000 respondents concerning their sports and physical activities. The results of this survey are described by age group explaining the frequency and intensity of their sport and physical activities and the reason why they (not) perform these physical activities (Visser & van den Dool, 2016).

According to the results of the survey, there are noticeable characteristics of certain age groups. Young people don't always have the time for physical activities or sports. Actually, having not enough time is in general one of the main constraints when it comes to sport participation and physical activity (see also Table 1). However, research also shows that people who participate in sport and physical activity don't have more spare time than people that don't participate in sport or physical activity (Breedveld & Mulleneers, 2011 in Hoekman et al., 2014). This group could benefit from an (urban) environment that stimulates to become more physical active whenever they want. This could avoid spending time

on travelling to and from a fitness center or other sports locations. This approach might also be a solution for those who suffer from the extra financial costs that comes with sports and physical activities at a commercial sport location. This indicates that age isn't the only factor that influences the amount of physical activity of a person. There are also socio-economic factors involved with the health and physical activity someone has (Deelen et al., 2016).

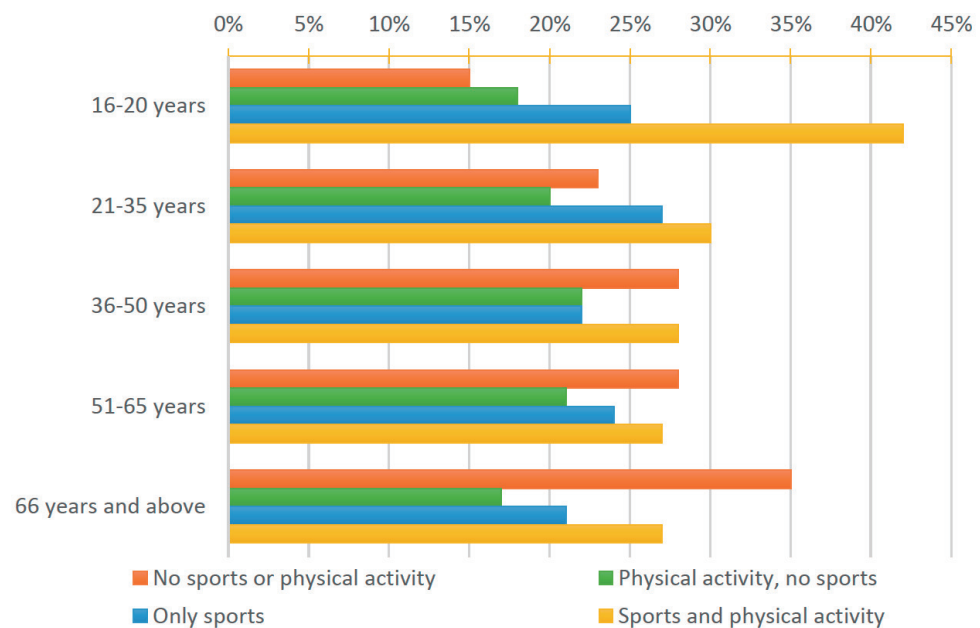


Figure 6: Figure 6: Sport and physical activities by age.
Source: Visser & van der Dool (2016).

Socioeconomic status

The social economic position has an influence on the physical activities of a person (Deelen et al., 2016; Jansen et al, 2016; van den Dool & Tiessen-Raaphorst, 2014). Work location by socio-economic status for instance is important when it comes to physical activity. Compared to adults with lower education, those with higher education spent less time being physically active while they are at work (Jansen et al., 2016). The reason is that higher educated persons most often have jobs characterized by sedentary behavior as much seated work is involved. Lower educated persons often have jobs that requires them to be more physically active like construction workers (Jansen et al., 2016). On the other hand, high educated people participate more in sports than lower educated people, as figure 7 also shows (van den Dool & Tiessen-Raaphorst, 2014, p. 33, 72). Figure 7 shows that lower educated people have more weekly walking minutes, but comply less with the Dutch Combinorm than higher educated people. The weekly sport participation is much higher among higher educated people than lower educated people. There could be several reasons for this. A lower income for example can be related to lower education. With a lower income, sport participation can be too expensive (18% for non-sporters, see Table 1). Another explanation could be that people with lower education more often have jobs that requires them

to be physically active, while higher educated people do more sedentary work, as also discussed by Jansen et al. (2016). To compensate this sedentary behavior, higher educated people might find it more necessary to participate in sports, while lower educated people already have enough physical activity during their workhours.

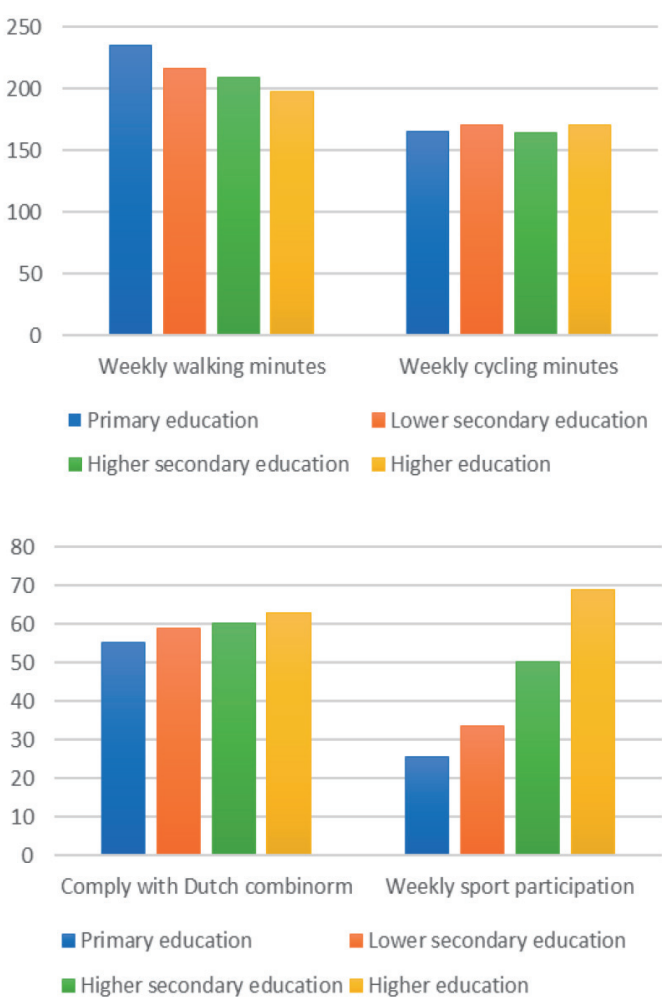


Figure 7: Physical activities by educational level.
Source: RIVM (2015).

Figure 7 includes adults above the age of 25. Children under the age of 15 for instance, aren't old enough to be in higher education because they are still in secondary education.

Vogels (2014) states that the sport participation is the highest among schoolkids and students (they are young, and young people sport more often). Adults with jobs participate less in sports activities, but people without jobs participate even less in sport activities (Vogels, 2014). The constraint for adults with jobs could be that they are too busy with work to participate in sports, while the adults without jobs don't have the financial resources or think they are too old to participate in sports (retired people for instance).

Ethnicity

For a long time, the sport participation of not-western migrants was much lower than the sport participation of western migrants and the native Dutch people. Since 2013 there is a less significant difference between these three ethnic groups. There are three main reasons for this development:

- More migrants belong to the second migration generation;
- Migrants assimilate in the Dutch sports culture;
- In most cases, migrants have a higher educational level than their parents (Vogels, 2014).

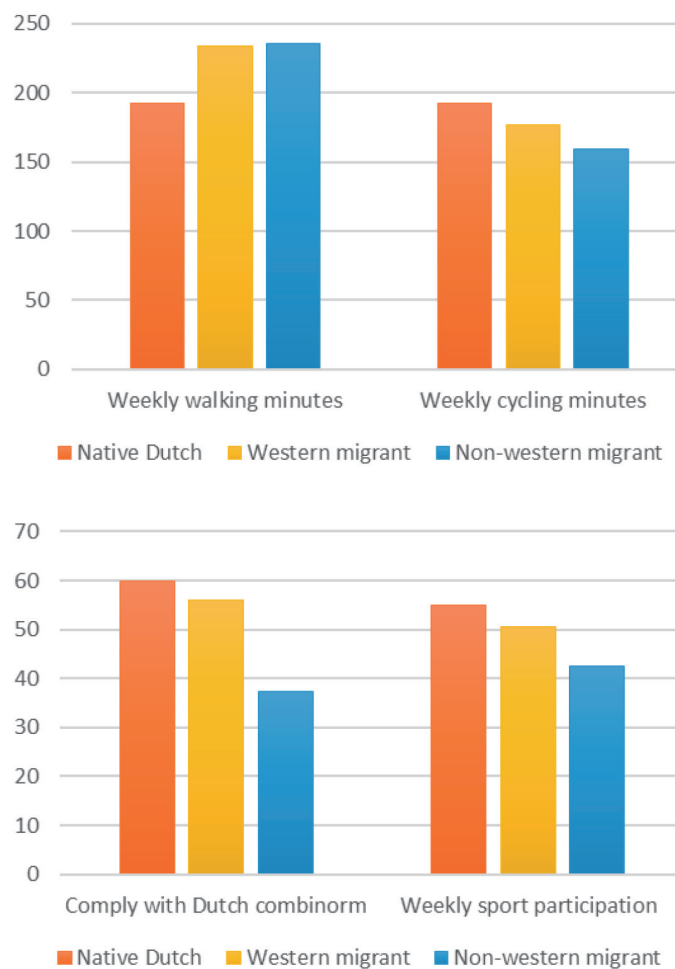


Figure 7: Physical activities by ethnicity.
Source: RIVM (2015).

The sport participation of primarily Moroccan and Turkish (female) migrants is less than other non-western migrants such as Antillean and Surinamese migrants. The sport participation of Dutch-Antillean and Dutch-Surinamese children is the same as it is for native Dutch children (Vogels, 2014). As Figure 8 shows, the percentage of non-western migrants that comply with the

Dutch fit norm (37%) is much lower than the percentage of the native Dutch (60%) and western migrants (56%). The figures for weekly sport's participation are similar. These findings could also be linked to the relatively low socioeconomic status of non-western migrants. Also, differences in culture and language can explain sport and physical activity behavior (RIVM, 2015).

As Figure 8 shows, the native Dutch are significantly less involved in weekly walking than western and non-western migrants. On the other hand, native Dutch are compared to the other groups more involved in weekly cycling. In total, they spent on average about 192 minutes on walking and cycling (RIVM, 2015).

Urban environments

The presence of technological devices such as mechanical transport modes, elevators, remote controllable devices and the internet are some reasons why people in the Netherlands are less physical active. The (urban) environment can change this trend by stimulating people to be physically active in their daily lives for example by using active transport modes. This is especially important for people who don't exercise very often (Boonstra & Hermens, 2011 pp. 11-12).

The design of residential areas is related to the physical active behavior of residents (Alleman, 2005; Tiessen-Raaphorst & van den Dool, 2014). Neighborhoods with a safe traffic environment provide more opportunities for walking and cycling than neighborhoods offering less safe traffic situations. A safe traffic environment is especially important for children, because they are bound to the neighborhood when it comes to physical activity (de Vries et al., 2010).

There is an increase in non-official (non-organized) sports participation in the urban environment of the Dutch cities. This means people are exercising, but not bounded to a certain sports facility (Hoekman & Tiessen-Raaphorst, 2012). For example, children are playing on informal play areas like sidewalks, streets or city squares (Boonstra & Hermens, 2011 p. 13). A recent Dutch research among 776 adults shows that 39% of the participants primarily use public space for their sport activities. This research also states that 'public space is a potentially attractive sports facility for many, including both participants and non-participants' (Deelen et al., 2016. p. 260). Multifunctionality of public space is key when it comes to a physical active-friendly environment. A multifunctional public space can be used for (sports) activities where people of all ages can exercise and meet (Engbers et al., 2010). The multifunctional space can be used more frequent for different types of activities in different timeslots. As a consequence, multifunctionality attracts more people which can contribute to the attractiveness of public space (Cammelbeeck et al., 2014 p.22).

A physical active friendly environment can stimulate livability, social cohesion, social capital, a healthy lifestyle, better school and work performance, neighborhood identity, city marketing and participation (NISB, 2012). The Dutch Institute for Sports & Exercise 'Nederlands Instituut voor Sport & Beweging', NISB, identifies six points which contributes to the development of physical active friendly environments (NISB, 2012):

1. An environment with facilities in the public space where people (children) play, exercise, sport, meet each other and travel;
2. An environment where users are stimulated (by offering information and activities) to active travel, exercising, playing and sporting;
3. An environment that not only facilitates amenities, but also offers activities which are bound to the

- environment to ensure durable usage of the environment;
4. An environment that is clean, complete/whole, safe and accessible;
 5. An environment that is established through commitment with the users of that space and in corporation with the public and private sector;
 6. A physical active environment should be applied and tailored to the appropriate scale level.

However, stimulating daily physical activity requires more than the adjustment of the physical (urban) environment. It's an important first step, but there are also other important elements that ensure people make use of the urban space for daily physical activities. Cammelbeeck et al. (2014) distinguish two factors that are important to create a physical active public space: hardware and software. Hardware is about the physical environment and facilities in the area, while the software is about activities, coaching, awareness, education and communication that is needed to stimulate exercise in the urban space (Cammelbeeck et al., 2014 p.8). This 'software' can be facilitated by residents, but also by websites or mobile apps. Software is key for organizing sport and other physical activities in an urban environment. Organizing sport events, bicycle and walking tours and involvement of volunteers are some examples of 'software' that facilitates physical activity in the urban environment. The combination of hardware and software will transform the public space from an area where sports and exercise is possible to an area that creates and facilitates sports and exercise. Therefore, it's important to make use of the appropriate software that suits the audience.

According to several studies, the residents of neighborhoods with a high population density and a diverse urban design, walk more than residents of neighborhoods with a low population density (Boonstra & Hermens, 2011, p.13). Neighborhoods with lower population densities often lack sufficient numbers of residents to make nearby amenities economic viable. In these lower density areas, physical active traveling (i.e. walking, cycling) to amenities is less attractive because of the relative large travel distances. In addition, the existing green and blue infrastructure in low density neighborhoods are sometimes seen as unsafe and unattractive due the lack of usage (Cammelbeeck et al., 2014, p.18).

Besides distance, infrastructure is key in stimulating active travel. Street lights, sufficient crosswalks, wide sidewalks and green infrastructure are elements that make walking more attractive and stimulates active travel and physical activity (Bauman et al., 2012). However, sidewalks are often barricaded by parked bikes, cars or light poles. These obstacles block the walkway of the sidewalk which has a negative effect on physical active travel. The importance of efficient and safe infrastructure is not only important for pedestrians, cyclists also benefit from these infrastructural conditions. A well-organized cycling infrastructure offers people efficient routes to travel in daily life. To make active travel for trips like commuting, shopping and accompanying children efficient, the infrastructure should connect neighborhoods with schools, (train)stations, workplaces, etcetera. The routes should be safe, direct (no detours) and fine-grained to ensure people will make frequent use of the infrastructure.

3.4 Policy and practice: green infrastructure and open spaces in Eindhoven

In this part, we zoom in on the city of Eindhoven. We focus on the policies regarding health-related behavior and exercise in urban public open spaces. Which policy does the municipality of Eindhoven undertake to stimulate health behavior? And are there any practice examples regarding the implementation of this policy?

Brabant Health Deal

To increase the livability and stimulate health-related behavior on a national scale, the national government started the project Smart & Healthy City in 2012. Eindhoven is the first pilot city of this national 'Smart & Healthy City' policy. The 'Smart & Healthy City' policy involves a variety of initiatives and projects concerning public health and smart government. One of these initiatives is the Brabant Health Deal, a partnership with the province Noord-Brabant, Den Bosch, Breda, Tilburg and Helmond. Important themes within this policy includes social capital, quality of life and creating a facilitative and adaptive environment for healthy behavior, welfare and care. This Brabant Health Deal consists of seven objectives, two of which are related to health-related usage of urban public open spaces (Provincie Noord-Brabant, 2016 p.7):

1. Creating an urban environment and infrastructure that encourages healthy lifestyle and behavior.
 - Space and amenities for growing up healthy, keeping adults healthy and aging on a vital and healthy manner.
 - Public space and infrastructure which suits an active lifestyle and stimulates active travel i.e. walking, cycling, etcetera.
 - Sports and cultural heritage forms a societal base.
 - An environmental policy based on (mental and physical) health increase.
2. Using interactive technology as serious games and gamification to create a healthy, social and caring society.
 - A clean and safe environment
 - An environment that encourages healthy behavior
 - A learning and participating environment

Eindhoven health policy

In 2011, the municipality of Eindhoven published a policy report on the future of the public health in Eindhoven. The report states that a movement friendly neighborhood encourages its residents to exercise more (GGD Brabant-Zuidoost, 2011). One of the larger problems in Eindhoven is obesity among adults. About 11% in the age group of 19-64 years and 17% of the age group of 65+ cope with obesity (GGD Brabant-Zuidoost, 2011 p. 50). To prevent obesity on an older age, the municipality tries to keep its residents stimulated to exercise from an early age. The report states that the physical environment has to stimulate movement among people in order to reach this goal. This is important for children as it is important for the elderly which suffer from diabetes and obesity. To that purpose, several policy documents have been issued.

In the policy document on 'sports and exercise' (Bewegen door Verbinden 2016 – 2020) various ways to exercise and to perform sports (Gemeente Eindhoven, 2016) have been identified:

1. Sports and exercise which are performed in public space i.e. walking, jogging, and cycling
2. Sports and exercise which are bound to certain facilities i.e. swimming, squash, and fitness
3. Sports and exercise at sports clubs

Previously, people often attend sports clubs or associations to sport and exercise, nowadays they

increasingly prefer to exercise in public spaces. Primarily people who live closer to natural environments will be more likely to make more use of the public space for their physical activities and sports than indoor facilities (Deelen et. al., 2016). Public spaces have less accessibility and supply related constraints and higher sport frequencies compared with sporting (indoors) at sports club for example (Deelen et. al., 2016). Eindhoven is designed for children to play in but also for adults to exercise. For instance, every child has access to a playground within 400-500 meters from their home. However, based on the trend to use more often 'ordinary' public space for sports and physical exercises, the municipality is reluctant to develop more playground and want to focus on improving the existing public space for the use of (urban) sports and play. In developing and implementing their plans, the municipality uses the full potential of Eindhoven by working together with institutions for culture, sports, education and innovation to create places which are accessible for everyone and every kind of sports and exercises. Multifunctionality is key in this process where residents feel free and stimulated to exercise in any way possible.

To adjust public space to meet above demands, the 'Handbook of Public Space' has been issued. In this document, the municipality of Eindhoven formulates policy measures for public space to invite people to physical exercise and recreate (Gemeente Eindhoven, 2017). This can be achieved with the construction of proper sidewalks, attractive parks and sufficient playgrounds for children. Elements as meeting places, sports, physical activity and stimulating the use of the public space are key in the design of the public space to assure that residents are willing to be physical active in public space. There is a lot of attention for the upcoming 'urban sports' in the public space such as parkour/free running, BMX, skateboarding, street soccer and basketball, fitness bootcamp/calisthenics (see figure 9) or dancing in parks or plazas (Gemeente Eindhoven, 2017).



Figure 9: Calisthenics park in Eindhoven. This park is part of the Urban Sports Valley in Strijp-R (calistheniceindhoven.com, 2017).

As part of public space, blue and green infrastructures in Eindhoven are redeveloped to stimulate sports, exercise and healthy behavior. Green open space is used for sports such as parkour, survival or bootcamp. In the past many waterways have been removed in Eindhoven but nowadays the municipality is recovering these waterways as much as possible. This blue infrastructure can be used for sports such as rowing, canoeing, swimming and diving.

New technologies are also of importance when it comes to stimulating people to exercise and be physical active in public space. Many people use smartphone applications and wearables to track their progression in the sports they perform (Janssen et.al., 2016). These applications are valuable for motivation and coaching. With the use of interactive functions, they can offer individual training programs, feedback and connect with other people. As a result of a study, among 3120 respondents that participated in three different sport events in Eindhoven, about 86% makes use of smartphone applications or wearables (Janssen et. al., 2016). Social media is important when it comes to organizing sport events or meetings with small scale exercise groups. For example, Whatsapp or Facebook groups are used to organize exercise events or small walking/running sessions. People can motivate each other with the use of social media.

As a city which is known for its high-end technology and innovation, Eindhoven is using this technology and innovation for healthy urban living. For example, since 2014, the Eindhoven Fontys School of Applied Sport Sciences and the Eindhoven University of Technology are working on smart running and walking routes. These smart running and walking routes should stimulate unorganized sports and physical activity in public space by using smart technology to stimulate healthy behavior (Janssen et. al., 2016).



Figure 10: Prototype of a smart walking route with interactive poles. It's called 'Finse piste 2.0'.
Source: Twitter (2017).

Use of public space for promoting physical activity in Eindhoven: best practices

Spacewalking in the 'Stadswandelpark'

People can use their smartphone or tablet to experience a space world with an online app when they walk in the Stadswandelpark in Eindhoven (Figure 11). There are over 40 sightings in the application. The virtual layer creates a museum in the public space. People can experience a different environment when they use the application on their smartphone or tablet. The park itself already has a sculpture garden and diverse vegetation. The use of interactive technology creates a different experience of this area. It is questionable however, on which scale people keep coming back to this park to experience the spacewalk when they already experienced it before.

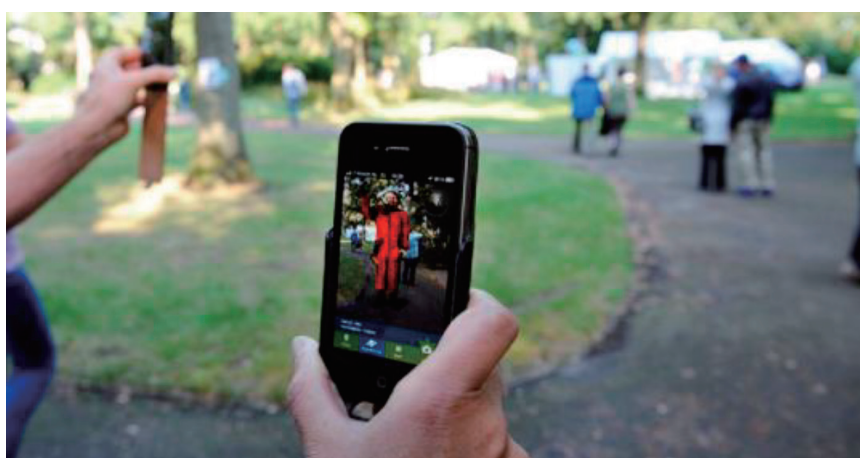


Figure 11: Spacewalking in the Stadswandelpark, Eindhoven.
Source: Ruimtewandeleninhetpark.nl (2017).

The Hovenring

On the 29th of June in 2012, the Hovenring was opened. The Hovenring is a lifted bicycle lane which is suspended from a 70-meter-tall pylon. The structure makes it seem like the bicycle lane is floating in the air which makes it a landmark for Eindhoven, Veldhoven and Meerhoven, after which the ring got its name. Since the bicycle lane is lifted, cyclists are not faced with the car traffic below them. This makes it safer and faster to cycle. Therefore, the Hovenring could stimulate active travel for the people of Eindhoven.



Figure 12: Hovenring, Eindhoven .
Source: Hovenring.com (2017).

Eindhoven Urban Trail

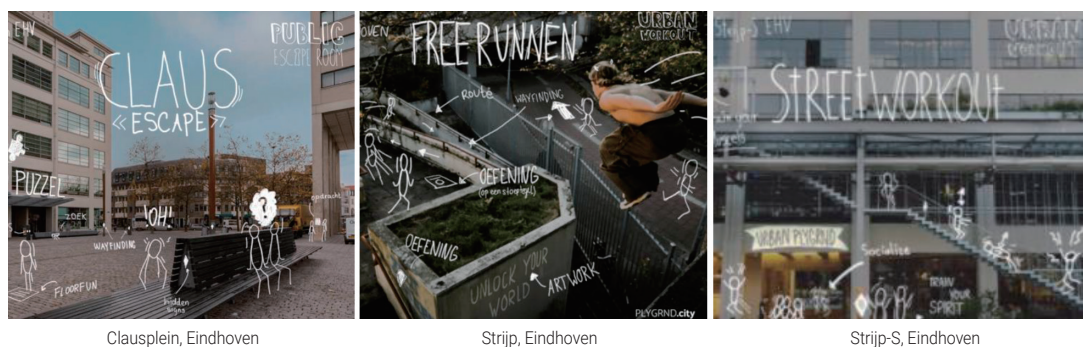
The Eindhoven Urban Trail is a running route, but not like any other running route. This route runs past (and even through) buildings, historical places and unique urban locations. People run for example through a hotel in the city or through the local supermarket. That gives the route a unique experience in public space.



Figure 13: People running the Urban Trail in Eindhoven. Through a restaurant and a supermarket.
Source: Eindhovenurbantrail.nl.

PLYGRND

PLYGRND encourages healthy behavior and bringing people closer together by creating gamification in the public space. The city can be a playground for healthy urban living according to PLYGRND. They achieve this by making the city a playground where people can be physically active, meet each other and be happy. There are five PLYGRND locations in Eindhoven. Each of them has a different theme, from urban workouts, walking routes or escape rooms in open spaces (PLYGRND.city, 2017).



Clausplein, Eindhoven

Strijp, Eindhoven

Strijp-S, Eindhoven

Figure 14: Three PLYGRND locations in Eindhoven. By giving playful assignments and challenges related to the built environment (jump here, go over this object, run these stairs, etc.), users will be more physically active in the public space.
Source: PLYGRND.city (2017).

Smart running lights

Joggers in the neighborhood of Eckhart, Eindhoven, are assisted by lights that light up on an adjustable phase that corresponds with the runners' phase. There is no mobile application needed to adjust the lights' phase, but in future it will be possible to adjust even more with a mobile application. With the smart light, runners will be stimulated to be physically active in public space.

GameBus

GameBus is an application that encourages families and friends to stay socially, mentally and physically healthy by rewarding them in a gaming experience. The goal of GameBus is to stimulate positive interaction between people. Teamwork is important in the various physical, cognitive and social activities. GameBus makes use of other applications as Runkeeper and Fitbit and gives points when players perform certain physical, cognitive or social activities. The individual achievements are shared with friends and family. Users can also see the scores (the amount of points that someone has) of other family members or friends. That's how people are stimulated to stay physically and socially active (Gamebus.eu, 2017).

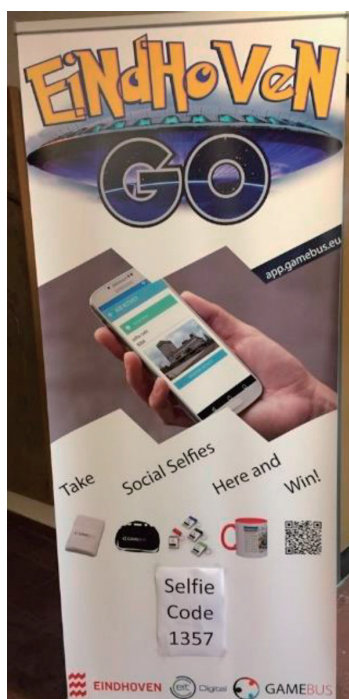


Figure 15: Gamebus stimulates people to be physically active by playing games like Pokémon Go.



Figure 16: B-riders. Source: Bidders.nl (2017).

B-rider

The B-Rider project is an initiative to stimulate bicycle usage among residents in Noord-Brabant. A mobile application keeps track of the kilometers that users cycle instead of drive, to work for instance. For each cycled kilometer, the user earns points. These points can be used to buy presents, make chance in the B-Riders lottery or to donate money to charity. Some employers even compensate employees who use the B-Ride app with €0,10 each cycled kilometer. The results of this initiative are positive. In 2016, about 5000 people used their bike to travel to work instead of their cars. This leads to approximately 4000 less car rides each day during rush hour (briders.nl).

Cruyff Courts

There are eight Cruyff Courts in the city of Eindhoven, named after the legendary Dutch soccer player Johan Cruyff (Cruyff-foundation.org, 2017). The Cruyff courts are designed for children to stimulate them to play outside and be physically active. With the Cruyff Courts, children have a proper and safe place to play sports. It's a meeting place for children. A place where themes such as respect for each other, health, integration development and playing together are central (Cruyff-foundation.org, 2017). The courts are also used for social activities for children by the local government, schools, sport and soccer associations and the local business community.



Figure 17: Cruyff Court Eindhoven, Jagershoef Veld.
Source: Cruyff Foundation (2017).

KWIEK urban exercise route

The first urban exercise KWIEK route was implemented in Eindhoven. The KWIEK urban exercise route is designed for the elderly but is accessible for everyone in the open space. The KWIEK route gives the opportunity to be physically active in the open space of Eindhoven. This is done with the use of street furniture. By placing signs with physical exercises on lampposts, sidewalks for instance. When people walk the KWIEK urban exercise route, they encounter the signs which gives them certain objectives that involve physical activity; reach the lamppost as high as possible for instance, or stretch on a street bench (Kwiekbewegroute.nl, 2017). The urban exercise route is not only stimulating physical activity, but also social interaction as it is mostly performed in small groups led by a coach.



Figure 18: KWIEK movement route. This objective requires people to walk on the straight line (balancing).
Source: Kwiekbewegroute.nl (2017).

Smilefactor Eindhoven

While many best practices involve stimulating physical activity, the 'Smilefactor' initiative primarily focuses on mental wellbeing of the citizens in Eindhoven. One example is the tunnel of silly walks, which is inspired by the Monty Python sketch (involving John Cleese). These projects are about making people happy, enjoying public space and increasing their social wellbeing. By making formerly unattractive places into places where people 'smile'. Other examples involve paintings on walls and other street art. By flourishing these public spaces they can be a platform for social activities which increases social cohesion and opens possibilities for social capital.

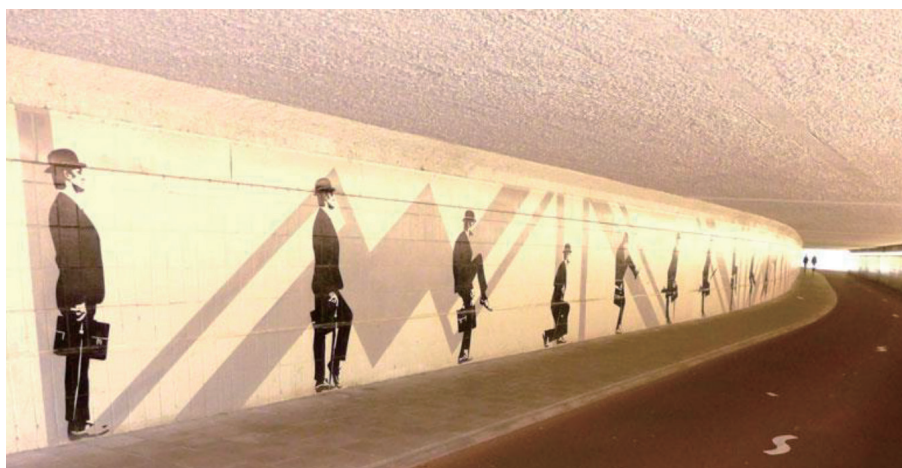


Figure 19: Tunnel of Funny Walks in Eindhoven. This tunnel is based on the Monty Python sketch involving John Cleese. The tunnel was opened by the actor himself. Source: Magicaldaydream.com (2017).

Exercise garden for the elderly

To stimulate physical activity among the elderly, an exercise garden for the elderly was developed in the neighborhood of Doornakkers in Eindhoven. This exercise garden is an initiative of the Catharina Hospital in Eindhoven. The exercise garden is designed for the elderly in cooperation with Vitalis Berckelhof, which is a nursing home for older people. The exercise garden offers the possibility for the elderly to be physically active while being outside.



Figure 20: Exercise garden for the elderly in Doornakkers, Eindhoven. Source: Onsplatform.tv (2017).

FLO

An interactive and innovative way to stimulate active travel is launched April 2017 in Utrecht and May 2017 in Eindhoven. This instrument is called Flo and is designed by Springlab. It all started with 'The Happy Biking Project' in September 2014. According to Springlab's research, one of the biggest cycling frustrations is waiting for traffic lights (33% out of 1500 people). The city of Eindhoven counts many traffic lights which are designed to make cycling safer. The research results show that, in spite of making cycling safer, much cyclists get frustrated when they have to wait for a red light (Springlab, 2017). Springlab comes with a solution for this problem with the Flo. Flo shows a symbol when cyclists approach the traffic light. This symbol indicates if a cyclist has speed up, slow down or maintain current pace to catch the green light.



The main goal of Flo is making cycling more enjoyable by taking away the frustration of waiting at a red traffic light. By doing this people will be more stimulated to travel active instead of taking the car or bus. Flo also improves the traffic flow on the bike lines now cyclists can avoid many red lights. (Fietsflo.nl, 2017).

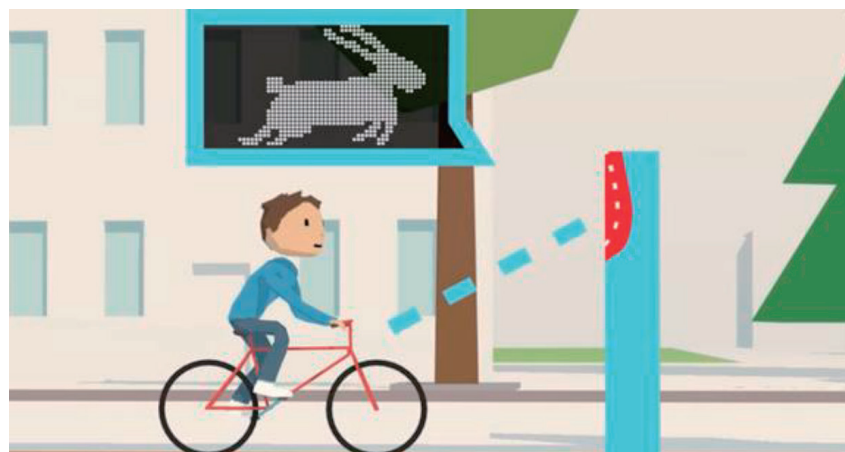


Figure 21: How FLO works. (2017).
Source: Springlab (2017).

Sona Play Arch

The Sona Play Arch is a product of the Dutch manufacturer Yalp. Yalp combines the best of video games and outdoor play to create playgrounds for children, but also other audiences. The Sona play Arch offers ten games for children to play outside. Each game is different and combines music with physical activity and learning. The colored arch is recognizable from a distance, therefore it is a real eyecatcher. The Sona Play Arch is interactive because it uses sound and movement to create a playful environment for the

users. A motion camera is placed in the top of the arch to capture the movements of players on the playfloor beneath the arch. With this camera it's possible to give the players feedback, which will motivate them to keep playing and challenge themselves (Yalpinteractive.com, 2017).



Figure 21: Sona Play Arch in Eindhoven.
Source: Yalpinteractive.com (2017).

Discussion

Especially, in comparison with other European countries, the health profile of the Netherlands shows that Dutch people score above average for sports and physical exercises but lower than the Scandinavian countries. However, in daily physical activities such as walking and cycling the Netherlands are by far European frontrunners. These results give the impression that the integration of physical activities in ordinary daily life is highly developed in the Netherlands. Large investments in cycling infrastructure and a long-standing tradition of cycling have developed a 'cycling culture' which over the generations has been internalized by most Dutch. Such a cycling culture facilitates rather unconscious cycling as the most natural and habitual way of travelling in daily life. Although, in the Netherlands much less research has been done on walking, this might be also applied on walking activities in daily life. In this respect, paid work might be relevant. The lower educated people are often involved in work activities in which they have to be physical active, including walking. More focus on stimulating walking in daily life should be encouraged to further develop a 'walking culture'.

Most Dutch sports activities take place in organized settings and use dedicated sport facilities. Although, there are differences between age categories most Dutch are not used to use public space, such as parks and streets, for sports activities or physical exercises. Lack of time, financial constraints and absence of a partner interested in these physical activities are often mentioned as reasons not to participate. These arguments might be related to experienced lack of safety, absence of appropriate facilities in the residential environment or a culture which doesn't encourage sufficiently obvious intensive sports activities in open public space. Integration and internalization of sports activities in public open space for all is still quite a challenge in the Netherlands.

Many initiatives to address challenges to integrate and internalize PA in ordinary daily life have been taken or are planned. Especially, the initiatives which are most easily to integrate in ordinary daily activities of people are promising. In this respect, in Eindhoven best practices are the Smile factor, Spacewalking, B-rider, Flo and parts of the Kwiek exercise route. More initiatives should be taken to encourage walking. Why not initiating a B-walking program or a Flo-projects for walkers?

Conclusion

In general, in terms of physical activities the health profile of the Netherlands is above average in Europe. The Scandinavian countries take the top position in sports and physical exercises. The Netherlands is runner-up. For other physical activities such as walking and cycling the Scandinavian countries and The Netherlands have changed position. Large differences exist between socio-demographic groups. By increasing age the share of people which meet the demands of PA-norms is increasing. Probably, this is a consequence of diminishing (time) demands on PA by increasing age, work-related physical activities and for the elderly less time constraints on PA-activities. In contrast to higher educated persons, due to physical active work-related activities the lower educated persons participate less in sports activities.

The statistics give the impression that non-sports physical activities, such as walking, cycling and physical work activities, in the Netherlands are often integrated in daily life. The development of a cycling culture over the generations has contributed to the internalisation of cycling in most Dutch leading to a natural and habitual choice for cycling in daily life. For sports and physical exercise in public open space this is less the case. In Eindhoven, good initiatives have been undertaken and are underway. More focus is needed on stimulating walking.

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